This is a continuation of U.S. Serial No. 09/591,684 filed on June 9, 2000 entitled "Isolation System With Digital Communication Across A Capacitive Barrier" which is a continuation of U. S. Serial No. 08/841,409 filed on April 22, 1997 entitled "Isolation System With Digital Communication Across A Capacitive Barrier" (now U.S. Patent No. 6,137,827).

In the Claims:

Please cancel claims 1-32 and add new claims 33-90 as follows. The rewritten clean versions of all the pending claims are provided below.

1-32. (Cancelled).

33. (New) A method for providing an isolated bidirectional communication channel for data signals in a forward direction and in a reverse direction across an isolation barrier comprised of a plurality of isolation elements, the method comprising:

providing a powered system for a first side of the isolation barrier, the powered system connectable to the isolation barrier for driving a forward direction digital differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

providing an isolated system for a second side of the isolation barrier, the isolated system connectable to the isolation barrier for driving a reverse direction digital differential signal across the first isolation capacitor and the second isolation capacitor;

configuring the powered system and the isolated system to drive the forward direction digital signal and the reverse direction digital signal both through the same first

and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the forward direction and reverse direction digital differential signals;

configuring the powered system to provide a clock signal to the isolated system through at least one of the plurality of isolation elements;

configuring the powered system and the isolated system so that power is capable of being provided from the powered system to the isolated system; and

providing at least some power to the isolated system from across the isolation barrier.

34. (New) The method of claim 33, wherein the clock signal is provided from the powered system to the isolated system through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

35. (New) The method of claim 33, wherein at least one of the forward direction digital differential signal and the reverse direction digital differential signal includes both data and control information.

36. (New) The method of claim 33, wherein the forward direction digital differential signal comprises the data signal multiplexed with a control signal.

37. (New) The method of claim 36, wherein the reverse direction digital differential signal comprises said data signal multiplexed with a control signal.

38. (New) The method of claim 33, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

39. (New) The method of claim 33, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

40. (New) A method for providing an isolated bidirectional communication channel for data signals in a forward direction and in a reverse direction across an isolation barrier comprised of a plurality of isolation elements, the method comprising:

providing a powered system for a first side of the isolation barrier, the powered system connectable to the isolation barrier for driving a forward direction digital differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

providing an isolated system for a second side of the isolation barrier, the isolated system connectable to the isolation barrier for driving a reverse direction digital differential signal across the first isolation capacitor and the second isolation capacitor;

configuring the powered system and the isolated system to drive the forward direction digital signal and the reverse direction digital signal both through the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the forward direction and reverse direction digital differential signals, wherein at least one of the forward direction digital differential signal and the reverse direction digital differential signal includes both data and control information;

configuring the powered system to provide a clock signal to the isolated system through at least one of the plurality of isolation elements, wherein the clock signal is provided from the powered system to the isolated system through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor;

configuring the powered system and the isolated system so that power is capable of being

provided from the powered system to the isolated system to generate at least one power supply within the isolated system; and

providing at least some power to the isolated system from across the isolation barrier.

41. (New) The method of claim 40, wherein the forward direction digital differential signal comprises the data signal multiplexed with a control signal.

42. (New) The method of claim 41, wherein the reverse direction digital differential signal comprises said data signal multiplexed with a control signal.

43. (New) The method of claim 40, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

44. (New) The method of claim 40, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

45. (New) A method for providing a digital communication channel for telephone line data signals and control signals across an isolation barrier comprised of a plurality of isolation elements, the method comprising:

providing a first multiplexer located on the telephone line side of the isolation barrier to receive the telephone line data signals and the control signals, the first multiplexer providing a first multiplexed digital differential signal that is to be coupled to at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

providing a first demultiplexer located on the other side of the isolation barrier, the first demultiplexer configured to receive the first multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, wherein

bidirectional communication exists through the first and second isolation capacitors and wherein the first demultiplexer has a data signal output and a control signal output;

providing a power supply on the telephone line side of the isolation barrier that powers at least a portion of some circuitry on the telephone line side of the isolation barrier, the power supply generated from at least one signal transmitted across the isolation barrier; and

providing a clock signal on the telephone line side of the isolation barrier, the clock signal being transmitted across the isolation barrier through at least one of the plurality of isolation elements.

46. (New) The method of claim 45, further comprising:

providing a second multiplexer located on said other side of the isolation barrier, the second multiplexer configured to receive data signals and control signals, the second multiplexer providing a second multiplexed digital differential signal that is connectable to the first isolation capacitor and the second isolation capacitor; and

providing a second demultiplexer located on the telephone line side of the isolation barrier, the second demultiplexer configured to receive the second multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, the second demultiplexer having a data signal output and a control signal output;

whereby the first and second multiplexed digital differential signals are transmitted across the same first and second isolation capacitors so that bidirectional multiplexed communication of data and control signals across the isolation barrier is enabled.

47. (New) The method of claim 45, wherein the first multiplexed digital differential signal includes both data information and control information.

48. (New) The method of claim 46, wherein at least one of the first multiplexed digital differential signal and the second multiplexed digital differential signal includes both data information and control information.

49. (New) The method of claim 45, wherein the clock signal is transmitted across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

50. (New) The method of claim 45, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

51. (New) The method of claim 45, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

52. (New) A method for providing a digital communication channel for telephone line data signals and control signals across an isolation barrier comprised of a plurality of isolation elements, the method comprising:

providing a first multiplexer located on the telephone line side of the isolation barrier to receive the telephone line data signals and the control signals, the first multiplexer providing a first multiplexed digital differential signal that is to be coupled to at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor, and wherein the first multiplexed digital differential signal includes both data information and control information;

providing a first demultiplexer located on the other side of the isolation barrier, the first

demultiplexer configured to receive the first multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, wherein bidirectional communication exists through the first and second isolation capacitors and wherein the first demultiplexer has a data signal output and a control signal output;

providing a power supply on the telephone line side of the isolation barrier that powers at least a portion of some circuitry on the telephone line side of the isolation barrier, the power supply generated from at least one signal transmitted across the isolation barrier; and

providing a clock signal on the telephone line side of the isolation barrier, the clock signal being transmitted across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

53. (New) The method of claim 52, further comprising:

providing a second multiplexer located on said other side of the isolation barrier, the second multiplexer configured to receive data signals and control signals, the second multiplexer providing a second multiplexed digital differential signal that is connectable to the first isolation capacitor and the second isolation capacitor; and

providing a second demultiplexer located on the telephone line side of the isolation barrier, the second demultiplexer configured to receive the second multiplexed digital differential signal from the first isolation capacitor and the second isolation capacitor, the second demultiplexer having a data signal output and a control signal output;

whereby the first and second multiplexed digital differential signals are transmitted

across the same first and second isolation capacitors so that bidirectional multiplexed communication of data and control signals across the isolation barrier is enabled.

54. (New) The method of claim 52, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

55. (New) The method of claim 52, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

56. (New) A method of transmitting a digital data signal across a telephone line isolation barrier comprised of a plurality of isolation elements, the method comprising:

providing first and second isolation capacitors as at least part of the plurality of isolation elements of the telephone line isolation barrier;

providing at least one digital differential signal to at least two of the isolation barrier elements at a first side of the telephone line isolation barrier, the at least two isolation barrier elements comprising at least said first isolation capacitor and said second isolation capacitor;

receiving one or more isolated signals from a second side of the telephone line isolation barrier;

producing a clock signal from at least one of the received isolated signals;

synchronizing at least one isolated signal with the clock signal; and

generating a DC power supply from at least one isolated signal received across the telephone line isolation barrier;

wherein bidirectional communication exists through the first and second isolation capacitors.

57. (New) The method of claim 56, wherein the at least one isolated signal utilized to generate the DC power supply is also the at least one isolated signal utilized to produce the clock signal.

58. (New) The method of claim 56, wherein the at least one digital differential signal is the digital data signal, the at least one signal utilized to produce the clock signal being a different signal than the digital data signal.

59. (New) The method of claim 58, the digital data signal passing through said first and second isolation capacitors of the telephone line isolation barrier and the at least one signal utilized to produce the clock signal passing through a third isolation element of the telephone line isolation barrier.

60. (New) The method of claim 59, the third isolation element being a capacitor.

61. (New) The method of claim 56, further comprising combining the digital differential signal with control information to be transmitted across the isolation barrier, and separating the digital differential signal from the control information within circuitry on a phone line side of the isolation barrier.

62. (New) The method of claim 58, wherein the system is configured to transmit digital differential information in a forward direction and a reverse direction through the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the digital differential information in the forward and reverse directions.

63. (New) The method of claim 58, wherein the system is configured to transmit digital differential information in a forward direction and a reverse direction through a plurality of isolation capacitors.

64. (New) The method of claim 56, wherein the at least one digital differential signal includes both data information and control information.

65. (New) The method of claim 62, wherein the digital differential information transmitted in at least one of the forward direction or the reverse direction through the first and second isolation capacitors includes both data information and control information.

66. (New) The method of claim 56, wherein the clock signal is produced from a received isolated signal that is transmitted across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

67. (New) The method of claim 56, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

68. (New) The method of claim 56, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

69. (New) A method of transmitting a digital data signal across a telephone line isolation barrier comprised of a plurality of isolation elements, the method comprising:

providing first and second isolation capacitors as at least part of the plurality of isolation elements of the telephone line isolation barrier;

providing at least one digital differential signal to at least two of the isolation barrier elements at a first side of the telephone line isolation barrier, the at least two isolation barrier elements comprising at least said first isolation capacitor and said second isolation capacitor, and wherein the at least one digital differential signal includes both data information and control information;

receiving one or more isolated signals from a second side of the telephone line isolation barrier;

producing a clock signal from at least one of the received isolated signals, the at least one of the received isolated signals from which the clock signal is produced being transmitted across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor;

synchronizing at least one isolated signal with the clock signal; and

generating a DC power supply from at least one isolated signal received across the telephone line isolation barrier;

wherein bidirectional communication exists through the first and second isolation capacitors.

70. (New) The method of claim 69, wherein the at least one isolated signal utilized to generate the DC power supply is also the at least one isolated signal utilized to produce the clock signal.

71. (New) The method of claim 69, wherein the at least one digital differential signal is the digital data signal, the at least one signal utilized to produce the clock signal being a different signal than the digital data signal.

72. (New) The method of claim 71, the digital data signal passing through said first and second isolation capacitors of the telephone line isolation barrier and the at least one signal utilized to produce the clock signal passing through a third isolation element of the telephone line isolation barrier.

73. (New) The method of claim 72, the third isolation element being a capacitor.

74. (New) The method of claim 69, further comprising combining the digital differential signal with control information to be transmitted across the isolation barrier, and separating the digital

differential signal from the control information within circuitry on a phone line side of the isolation barrier.

75. (New) The method of claim 71, wherein the system is configured to transmit digital differential information in a forward direction and a reverse direction through the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the digital differential information in the forward and reverse directions.

76. (New) The method of claim 71, wherein the system is configured to transmit digital differential information in a forward direction and a reverse direction through a plurality of isolation capacitors.

77. (New) The method of claim 69, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

78. (New) The method of claim 69, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

79. (New) A method of transmitting a digital data signal across a telephone isolation barrier having a plurality of isolation elements, comprising:

combining the digital data signal with control information to form a digital encoded differential signal;

driving the digital encoded differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

receiving an isolated encoded differential signal from across the first isolation capacitor and the second isolation capacitor, wherein the digital encoded differential signal and the isolated encoded differential signal are transmitted across the same first

and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the digital encoded differential signal and the isolated encoded differential signal;

receiving clock information from across the telephone isolation barrier to provide an isolated clock signal;

synchronizing the isolated encoded differential signal with the isolated clock signal;

separating the isolated encoded differential signal into an isolated digital data signal and isolated control information; and

generating a DC power supply signal from at least one signal transmitted across the telephone isolation barrier.

80. (New) The method of claim 79, wherein the at least one signal utilized to generate the DC power supply also contains the clock information utilized to provide the isolated clock signal.

81. (New) The method of claim 79, wherein the digital encoded differential signal does not contain the clock information.

82. (New) The method of claim 79, wherein at least one of the digital encoded differential signal and the isolated encoded differential signal includes both data and control information.

83. (New) The method of claim 79, wherein the clock signal is produced from clock information that is transmitted across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor.

84. (New) The method of claim 79, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

85. (New) The method of claim 79, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.

86. (New) A method of transmitting a digital data signal across a telephone isolation barrier having a plurality of isolation elements, comprising:

combining the digital data signal with control information to form a digital encoded differential signal;

driving the digital encoded differential signal across at least two of the isolation barrier elements, the at least two isolation barrier elements comprising at least a first isolation capacitor and a second isolation capacitor;

receiving an isolated encoded differential signal from across the first isolation capacitor and the second isolation capacitor, wherein the digital encoded differential signal and the isolated encoded differential signal are transmitted across the same first and second isolation capacitors so that the first and second isolation capacitors bidirectionally transfer the digital encoded differential signal and the isolated encoded differential signal, and wherein at least one of the digital encoded differential signal and the isolated encoded differential signal includes both data and control information;

receiving clock information from across the telephone isolation barrier to provide an isolated clock signal, the clock information being transmitted across the isolation barrier through an isolation element that is separate from the first isolation capacitor and the second isolation capacitor;

synchronizing the isolated encoded differential signal with the isolated clock signal;

separating the isolated encoded differential signal into an isolated digital data signal and isolated control information; and

generating a DC power supply signal from at least one signal transmitted across the telephone isolation barrier.

87. (New) The method of claim 86, wherein the at least one signal utilized to generate the DC power supply also contains the clock information utilized to provide the isolated clock signal.

88. (New) The method of claim 86, wherein the digital encoded differential signal does not contain the clock information.

89. (New) The method of claim 86, wherein each of said plurality of isolation elements of said isolation barrier comprises a capacitor.

90. (New) The method of claim 86, wherein a portion of said plurality of isolation elements of said isolation barrier each comprises a capacitor.